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ABSTRACT

The modern, miniaturized computer as in information processor has radically altered the logic of three commonplaces regarding computer-based learning: (1) that the machine exerts a dehumanizing effect on the educational process, (2) that computers are too expensive to prove cost-effective in education, and (3) that the computer's facility in reiterating lessons violates the principle of individualization. The specific computer-assisted instruction (CAI) system at Whitworth College suggests point-for-point counter-arguments: (1) that careful CAI lesson design can actually enhance the humanization of course material, (2) that time-shared minicomputer systems have dramatically reduced user costs, and (3) that a computer-driven lesson sequence can prove to be unique (and thus individualized) each time it is run. The computer therefore can be humane, feasible, and can serve as a semi-intelligent extension of the instructor. The paper includes comments by student users plus a brief discussion of how instructors determine the appropriateness of curricular material for CAI. (Author)

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COMPUTER-BASED INSTRUCTION: A PEDAGOGICAL PARADOX

Paper read at 1973 annual meeting of Washington (State) Association of Foreign Language Teachers, Seattle: October 12

Ronald C. Turner--Whitworth College

Last month IBM lost a suit and was ordered to settle with the Telex Corporation for over a third of a billion dollars in a case that is sure to be debated by corporate lawyers for years to come. How did it happen that three decades' worth of congresses and attorneys general allowed a single corporation to become the largest monoply in the history of big business? I personally don't feel that IBM is all that wicked . . . as businesses go. And anyway, some of my best friends work for IBM. What I believe has happened really, although the press may never phrase it in quite this way, is that Telex vs. IBM has forced us to admit embarrassingly that we're up against some brand-new categories. The capacity for a wheelbarrowful of hardware, properly assembled and plugged in, to remember things--many, many things--has enabled us to construct systems which represent a radical discontinuity in the history of information technology.

I should like to argue this morning that the computer--or the information processor, as I prefer that we view it--has come up with some surprises of its own with regard to a few commonplaces of educational technology. I realize that this definition--violation of commonplaces--is a very low-level notion of paradox, but at least it makes it possible for the title of my remarks to be alliterative. And that is very important among humanists! So I should like to look closely at three commonplaces of educational technology and then examine in what way the computer, especially the minicomputer systems now being extensively marketed, have violated those commonplaces.

The first is the type of thing you would hear from the "touchie-feelie" movement

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or maybe from the PTA for that matter: "As patrons of the service, we are unique human beings, and we will not be subjected to inhuman machines." So the syllogism is as follows: inhuman processes are bad (pedagogically); the computer is inhuman; ergo the computer is bad (in the educational process). It is extremely tempting at this juncture to digress at great length to the semantics of the words "inhuman," "inhumane," and "mechanical." But I shall merely recapitulate the experiences of several of us at Whitworth who have seen this syllogism rewritten. Unlike adding machines, lab tapes, or filmstrips, the computer does not come from the factory hardwired or preprogrammed to do only a certain job. That is, our particular computer did not come to us as an accounts receivable machine or a Spanish syntax tutorial machine. Rather, certain individuals on the Whitworth campus literally poured themselves--their thought patterns, their pedagogical methods, their cleverness, and even their humor--into the design of the many educational and administrative systems currently in operation. It is little wonder that computer systems are referred to in terms of architecture. So it is precisely because a computer is totally programmable by real human beings that it has the potential of being an infinitely reproducible alter ego of each of its programmers.

But now for some specifics. From the standpoint of the professor, we have put together our own curriculum language called PIRATS (for Personalized Instructional, Remedial, And Tutorial System) which can be learned by any novice instructor in approximately two hours. (Our record is held by an English professor who came to an orientation session one evening and within twenty-four hours had a lesson module fully operable on the computer.) By means of our author language the instructor need not concern himself in the least with computer programming. He needs only to expend

his effort in being as creative, as humorous, as nasty, and as clever as possible in expressing his material in classical programmed form (frames, questions, branches, etc.). To date we have over a dozen curriculum sets available to our students in half a dozen areas of study.

But the real surprise came from the students. And it was not an unmixed bag. When asked whether the machine in their estimation approximated working with a live tutor, one exuberant student went so far as to say that it was <u>better</u> than a living tutor for his purposes. And here are some further comments:

> I didn't mind the mechanical aspect at all, because in many ways, it was far more practical and time-saving than a person.
>
> The machine surpassed what a live tutor would have by the fact that I could use my own discretion on when, what and how much I wanted to study.
>
> On the whole, it was as good or better than a person.
>
> Comes much closer to a live person than I wanted almost. Really must admit that the computer easily takes the place of a human . . . which is good in that it removes the tensions of not knowing responses and the friction between two people . . . if I was dumb the computer helped me without letting me feel dumb.
>
> I can say this, if I had not had the computer to help me, I would have either dropped out or failed this course.

The students here are responding to a questionnaire at the conclusion of a term of elementary Spanish in which all of their written work was performed at the computer.

The philosophy of Whitworth computer-assisted lesson design has been for instructors first to isolate, with scrupulous precision, those segments of their courses' activities which are already mechanical in nature and therefore unworthy of their salaried time and energy. That done, the task of writing computer-driven lesson modules practically directs itself. For now the instructor, because he has probably <u>already</u> been role-playing as a computer, simply rewrites the script in a slightly al-

tered format. So the major portion of our software effort this first year has been to make that rewriting process as simple as possible. The modified syllogism, as we see it, now reads:

1. Purely mechanical processes can most effectively be accomplished by a machine.

2. Some instructional tasks are purely mechanical.

3. Some instructional tasks can most effectively be accomplished by a machine.

Another commonplace that has been engraved on our eardrums is that computers are exorbitantly costly. It has heretofore been almost unthinkable to install a resident computing facility dedicated to undergraduate instruction. But here again there are some hidden flaws in the logic of the assumption. The first has to do partly with pure economics and partly with technology. Because of increased production and of miniaturization, computers have dropped in price in a very dramatic fashion during the past five years; so for that reason alone the unthinkable has become just a bit more thinkable, even for a college as economically troubled as Whitworth, and even without outside funding. But the major breakthrough in the economics of computing is a matter of system design, and the magic concept is time-sharing. In words that we can all understand, time-sharing describes a computer which can service many users at the same time. Under such an arrangement, there is a two-way deception at work. Each user is given the illusion that he is the sole user of the machine; he is unaware of the programs currently being executed by other users. As for the machine, on the other hand, it is led to believe that it is dealing with only a single user. What all of this means, with regard to cost, is that the same computing system may be used for administrative data processing, computer science courses, faculty and student research,

and computer-based instruction in a variety of disciplines. Not only can the pie be cut into more pieces, but the cuts themselves can be readily altered to fit the demands of the moment. These factors taken together mean that we finally can begin legitimately to compare machine cost and professor cost with regard to the acquisition of basic skills.

The last commonplace I should like to mention regards reproduction of material vs. individualization of material. When you call for VERBS or VERBS2 or METRIC or PACO this afternoon on the terminal in the display area during our demonstration, you will in a sense be asking that the same "record" be "played" for you that has been called for by students for over a year; it would seem that the same old programs just continue to be reproduced every time they are called up by the students. In short, the capacity of the computer to reiterate endlessly appears to militate against individualization, the cardinal pedagogical virtue of the seventies.

But again, as with the topics already discussed, there are some significant flaws in this assumption. On the one hand, there is a sort of competence/performance model (analogous to that discussed in linguistics) inherent in CAI programs, especially if they are carefully constructed. Although the frames may be the same for each student, the order and manner of their execution may be totally unique every time the lesson is run. And in the light of what we have said regarding the incarnation of a professor in his instructional computer program, it should be obvious that rerunning the same program in a limited sense accomplishes a reincarnation and further extension of the person who wrote the lesson. In the ideal case, it is the person and not only the material that is reproduced.

Contrary to the assumption of many critics and skeptics therefore, computer-assisted instruction can indeed be humane and economically feasible and can serve as

an extension of the instructor in a pedagogically creative fashion.

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